

# Records of *Cuthona pustulata* (Alder & Hancock, 1854) from the Canadian Pacific

by

TERRENCE M. GOSLINER<sup>1</sup>

Division of Mollusks, National Museum of Natural History,  
Smithsonian Institution, Washington, D.C. 20560

AND

SANDRA V. MILLEN

Department of Zoology, University of British Columbia,  
Vancouver, British Columbia, Canada V6T-2A9

*Abstract.* A tergipedid nudibranch found in the shallow subtidal waters of British Columbia, Canada, differs from all known sympatric species. Specimens closely resemble the descriptions of *Cuthona pustulata* (Alder & Hancock, 1854) previously known only from the northeastern Atlantic. The morphology of this species in both the northeastern Pacific and northeastern Atlantic is compared. Closely related and sympatric species are discussed.

## INTRODUCTION

A TERGIPEDID nudibranch first collected at Saltspring Island, Strait of Georgia, British Columbia, Canada, in May 1977, differed substantially from the four known sympatric tergipedid species (*Catriona columbiana* [O'Donoghue, 1922], *Cuthona albocrusta* [MacFarland, 1966], *C. concinna* [Alder & Hancock, 1843] and *C. divae* [Marcus, 1961]). This species, identified as *Cuthona pustulata* (Alder & Hancock, 1854) has been previously recorded from the northeastern Atlantic. Its presence in the northeastern Pacific represents a significant addition to its known range.

The genus *Cuthona* has been enlarged considerably, particularly in recent years. *Trinchesia*, *Xenocratena*, *Catriona*, *Njurja*, *Narraeolidia*, *Toorna*, and *Selva* are presently considered junior synonyms by MILLER (1977). The inclusion of the genus *Catriona*, however, has been disputed by GOSLINER & GRIFFITHS (1981). WILLIAMS & GOSLINER (1979) added *Precuthona*, as the type species *Precuthona peachi* (Alder & Hancock, 1848) appears to be a junior synonym of the type species of *Cuthona*, *Cuthona nana* (Alder & Hancock, 1842). GOSLINER (1981) also included *Subcuthona*, making a total of over 80 species

in this genus. *Cuthona* species are listed primarily in MARCUS (1958), SCHMEKEL (1968), BURN (1973), and WILLIAMS & GOSLINER (1979). BROWN (1980) re-described British species including the type species *Cuthona nana*.

## MATERIAL

On May 1, 1977, the first two specimens of *Cuthona pustulata* were collected by S. Millen, 15 m below Canadian datum at Musgrave Landing, Saltspring Island, British Columbia (latitude 48°48'N; longitude 123°32'W). On April 18, 1980, an additional eight specimens were collected from *Halecium* sp. by R. Long diving at 12 m in the same area.

At Porlier Pass, Galiano Island, British Columbia (latitude 49°01'N; longitude 123°36'W) on April 29, 1979, two specimens were collected by S. Millen on *Halecium* sp. at a depth of 10 m. A dive at this site by S. Millen on May 2, 1982, yielded 33 specimens and spawn on *Halecium* sp. at depths of 14-18 m. Seven voucher specimens have been deposited in the British Columbia Provincial Museum, BCPM 983.26.1, and six voucher specimens in the California Academy of Sciences, CASIZ 031673.

## DESCRIPTION

The body is slender (Figure 1) and up to 20 mm in length. Body color is translucent white with opaque white ovo-

<sup>1</sup> Permanent address: Department of Invertebrate Zoology, California Academy of Sciences, San Francisco, California.



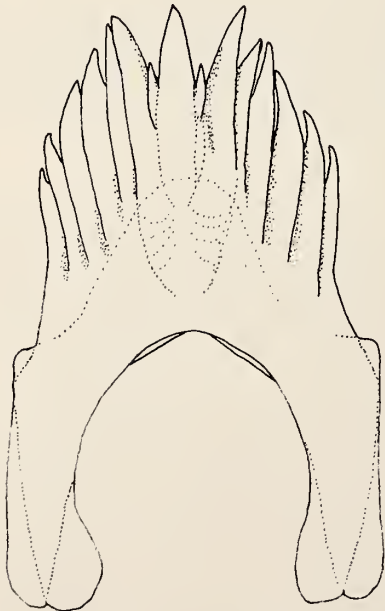
Figure 1

*Cuthona pustulata*, 16 mm in length. Drawn from a color transparency taken by Ron Long.

testis and brown jaws visible through the skin. The oral tentacles are cylindrical with blunt tips. They arise from the antero-lateral corners of the head and are flecked on the dorsal surface with opaque white spots. The rhinophores are smooth and slightly longer than the oral tentacles. They arise close to each other. Fine, opaque white spots decorate the rhinophores except near their bases. The head is globular with a T-shaped mouth opening.

The cerata are elongate and cylindrical, with rounded tips containing small, white cnidosacs. The liver divertic-

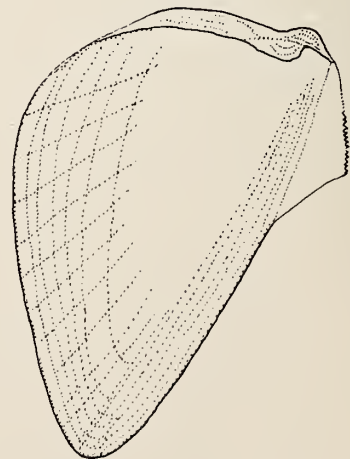
ula are dark reddish brown and granular. The ceratal sheath is transparent. Above the cnidosacs, the ceratal tips are clear. Each bears a faint, opaque white subapical band. There are small opaque white flecks on the distal halves of the cerata, and two or three large white spots on the proximal halves. The cerata are arranged in 8 to 14 rows. An example of the ceratal arrangement of a typical 16-mm specimen (live length) is 2,4,6,7,8; 6,6,5,4,4,3 on the right and 3,4,6,5,7; 6,6,4,4,3,2 on the left (using the counting method of EDMUNDS, 1970). The pre-cardiac rows are opposite; the post-cardiac rows are slightly anterior on the left side. The anus is posterior in the inter-hepatic space, just below the cardiac hump, with the renal pore directly ahead of it. The gonopore is below the second or third ceratal row of the right anterior liver branch.



20  $\mu$ m

Figure 2

Radular tooth drawn from a SEM micrograph.



1 mm

Figure 3

Jaw with a single row of denticles on the masticatory margin.

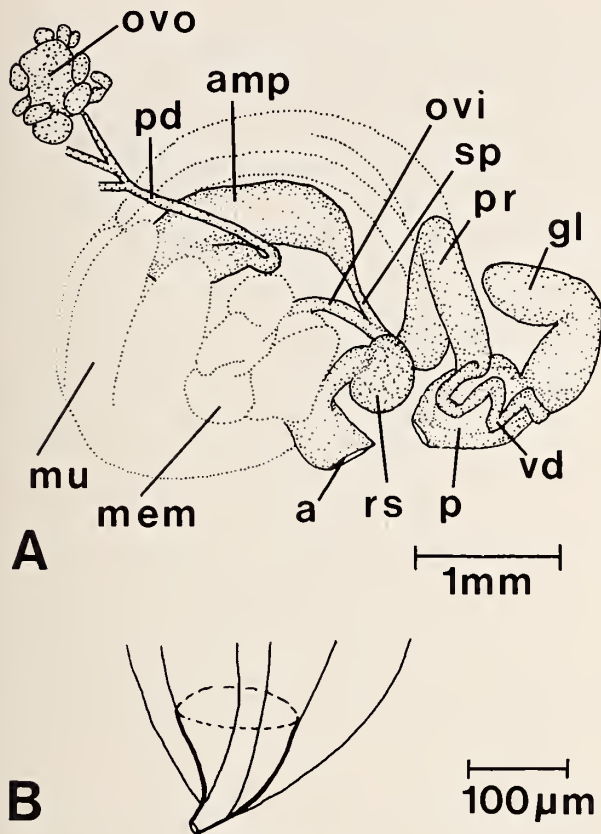


Figure 4

A. *Cuthona pustulata* reproductive system from a camera lucida drawing. Key: a, female aperture; amp, ampulla; gl, penial gland; mem, membrane gland; mu, mucous gland; ovi, oviduct; ovo, ovotestis; p, penis in sac; pd, preampullary duct; pr, prostate; rs, receptaculum seminis; sp, spermoviduct; vd, vas deferens. B. Penial tip showing stylet and vas deferens.

The foot is rounded anteriorly with a thickened anterior margin and a small flange. The long, pointed tail has an irregular line of opaque white spots.

The uniseriate radula contains 12 to 26 teeth. The central cusp is slightly shorter or equal in length to the first of the five to six laterals on each side (Figure 2). There is sometimes a small intermediate denticle on each side of the central cusp. The thin, triangular jaws (Figure 3) have a well developed masticatory margin with approximately 16 fine denticulations.

In the reproductive system (Figure 4) the ovotestis is connected by the preampullary duct to a small U-shaped ampulla. The postampullary duct branches to form an oviduct entering the female gland mass and a vas deferens enlarged into a prostatic portion. The more distal, non-prostatic portion of the vas deferens enters the penial sac at the junction of the large, unstalked, penial gland. The penis has a short, conical, 44–125  $\mu\text{m}$  long, stylet (Figure

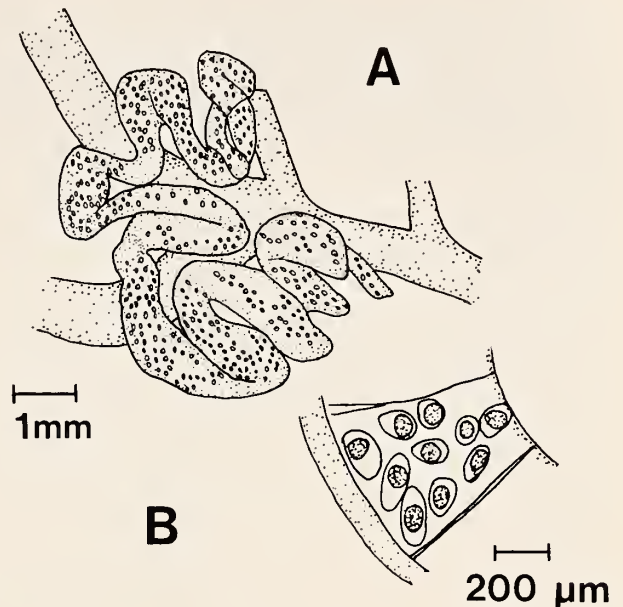


Figure 5

A. Egg mass of *Cuthona pustulata* laid on the hydroid *Halecium* sp. B. Close-up of the egg mass showing the single eggs and large capsules.

4B). There is a round, stalked receptaculum seminis near the separate, female aperture.

Spawning was observed in two different years in early May. The eggs (Figure 5) are laid on the shafts of *Halecium* sp., towards the center of these hydroid colonies, in concealed locations. The spawn ribbon, a white, convoluted coil attached by a small membrane, forms a sausage-shaped mass. The oval egg capsules are much larger than the eggs (Figure 5B). One egg 120  $\mu\text{m}$  in diameter is typical for each capsule, but occasionally there are two or three.

After 18 to 19 days at 10°C, the eggs hatched into planktotrophic veligers with Type 2 shells of THOMPSON (1961). The veligers developed eyes after three days and appeared competent by two weeks. Shortly after hatching the digestive gland turned green, an indication that the larvae were feeding. Metamorphosis did not take place and the veligers died after three weeks.

#### HABITAT

Animals were found subtidally on the hydroid *Halecium* sp. on rocky bottoms, 10 to 18 m below Canadian datum, in April or early May. In two different years the collection localities were rechecked unsuccessfully in June. Apparently the period of peak abundance is short.

#### DISCUSSION

Most *Cuthona* species vary considerably in coloration but have colors other than white on their notum, cerata, oral

Table 1  
*Cuthona pustulata* from Britain and the northeastern Pacific.

Locality	Britain (from BROWN, 1980)	Northeastern Pacific		
Max. live length	18 mm	20 mm		
Preserved length	8 & 11 mm	2 mm	7 mm	12 mm
No. ceratal rows	12	8	11	14
No. precardiac rows	6	3	5	6
Max. no. cerata	126	52	105	230
Max. no. cerata/row	8	5	7	15
Color:				
Ceratal epidermis	large white spots	large white spots		
Ceratal cores	lt. brown/pink/yellow	reddish brown		
Tentacles	white patches	white patches		
Rhinophores	white patches	white patches		
No. radular teeth	15-24	12-26		
No. tooth denticles	4-7/side; central shorter	5-9/side; central shorter or equal		
Jaw margin	finely denticulated	13-16 fine denticles		
Penial gland	base of vas deferens	base of vas deferens		
Penial armature	conical stylet	conical stylet		
Vas deferens	prostatic portion	prostatic portion		
Seminal receptacle	near female opening	near female opening		
Spawn mass	white, small coils	white, one convoluted coil		
No. eggs	approx. 700/spawn mass	approx. 450/spawn mass		
Egg size	180 $\mu$ m	120 $\mu$ m		
Larvae	? non-pelagic	planktotrophic; shell Type 2		

tentacles, or rhinophores. The large, distinctive, white spots on the cerata of our specimens, and absence of any other colors, were characteristics shared only by *C. fulgens* (MacFarland, 1966), *C. perca* (Marcus, 1958), and *C. pustulata* (Alder & Hancock, 1854).

*Cuthona fulgens* differs from our specimens in that the hepatic lobes of the cerata have a lemon-yellow band at their bases and below the cnidosacs. In addition, the radula of *C. fulgens* has a much larger number of teeth (59 compared to a maximum of 26 in our specimens), and its receptaculum seminis is located on a longer stalk, more distally positioned with respect to the female aperture.

*Cuthona perca* sometimes has olive-green flecks and a light orange head. When these are absent it nevertheless differs from our specimens in having olive-green to brownish digestive gland tissue in the cerata and notum. The radula has more teeth (35) with more denticles (up to 11 on each side of the central cusp). The rhinophores and oral tentacles of *C. perca* are shorter. It has a larger, more distinct inter-hepatic space and a longer tail. The spawn of *C. perca* is saccate, not coiled like that of our specimens. Lastly, *C. perca* has been observed to feed on anemones, not hydroids (GOSLINER, 1980).

*Cuthona pustulata* has been redescribed by BROWN (1980). Only minor differences were found between his material and ours (Table 1). The ceratal core variations found in the Pacific animals did not exhibit the range observed in Britain. *Cuthona pustulata* is known from Brittany, France to Iceland (BROWN, 1980). The addition of a locality in the northeastern Pacific suggests that it is an

amphi-boreal species which can be expected to range further northward in the Pacific.

*Cuthona pustulata* can be distinguished from sympatric tergipidid species in the northeastern Pacific. *Cuthona albocrusta* has short, inflated cerata with pointed tips rather than elongate, cylindrical ones; *Catriona columbiana* has orange rhinophore bands and white ceratal lines; *Cuthona concinna* has purple or brown hepatic lobes in the cerata, and *C. divae* has a greater number of cerata which extend anterior to the rhinophores. None of these sympatric species have large, opaque white spots on the cerata. There are significant internal differences as well. *Cuthona concinna* and *C. divae* lack a penial stylet. *Cuthona albocrusta* has more radular teeth (56-70) as does *Catriona columbiana*, which has a strongly tapered radula with a pre-radular tooth and upwards of 100 teeth. None of these species is found living on hydroids belonging to the genus *Halecium*.

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